This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (canceled)

1   Claim 2 (previously presented): The method of claim 11
2   wherein the path is a label-switched path.

1   Claim 3 (previously presented): The method of claim 11
2   wherein the message is a resource reservation protocol PATH
3   message.

Claim 4 (canceled)

1   Claim 5 (currently amended): A method for processing, by a
2   node of a network, a message carrying at least one network
3   path determination constraint, the method comprising:
4   a) performing a constraint-based path determination
5   to a next node to generate a partial path; and
6   b) forwarding the message carrying the at least one
7   network path determination constraint to an adjacent
8   downstream node on the partial path,
9   wherein each of the at least one network path
10 determination constraint is expressed in the form of a
11 program including one or more an executable instructions
12 instruction.

1   Claim 6 (currently amended): A network node comprising:
2   a) a path determination facility for performing a
3   constraint-based path determination to a next node to
4   generate a partial path; and
5   b) a signaling facility for

2

6   i)   receiving a message carrying at least one

7   network path determination constraint, and

8   ii)   forwarding the message carrying the at least

9   one network path determination constraint to an

10   adjacent downstream node on the partial path,

11   wherein ~~each of~~ the at least one network path

12   determination constraint is <u>expressed in the form of a</u>

13   <u>program including one or more</u> ~~an~~ executable <u>instructions</u>

14   ~~instruction~~.

Claim 7 (canceled)

1   Claim 8 (previously presented): The method of claim 11

2   wherein the at least one network path determination

3   constraint includes a list of at least one explicit node

4   specified to be a part of the path.

1   Claim 9 (original): The method of claim 8 wherein the list

2   of at least one explicit node specified to be a part of the

3   path identifies at least one of a strict-hop node and a

4   loose-hop node.

1   Claim 10 (original): The method of claim 8 wherein the

2   message forwarded to the adjacent downstream node on the

3   partial path includes an updated list, and

4   wherein the node maintains the initial instance

5   of the list, as received.

1   Claim 11 (currently amended): A method for processing, by

2   a node of a network, a message carrying at least one

3   network path determination constraint, the method

4   comprising:

3

5   a)   performing a constraint-based path determination

6   to a next node selected from a group of nodes

7   consisting of

8   (i) an area border node,

9   (ii) an autonomous system gateway node,

10   (iii) a node that can process one of the at least

11   one network path determination constraint carried

12   by the message which the present node cannot, or

13   will not, evaluate,

14   (iv) a specified loose-hop node, and

15   (v) a node to which constraint processing is

16   delegated,

17   to generate a partial path; and

18   b)   forwarding the message carrying the at least one

19   network path determination constraint to an adjacent

20   downstream node on the partial path, or to a delegated

21   node that is able to carry out the path determination,

22   wherein ~~each of~~ the at least one network path

23   determination constraint is <u>expressed in the form of a</u>

24   <u>program including one or more</u> ~~an~~ executable <u>instructions</u>

25   ~~instruction~~.

1   Claim 12 (original): The method of claim 11 wherein each

2   executable instruction includes:

3   -   information about a first operand;

4   -   information about a second operand; and

5   -   an operation code.

1   Claim 13 (original): The method of claim 12 wherein the

2   operation code identifies an operation selected from a

3   group of operations consisting of:

4   -   bit-wise AND;

4

5   - bit-wise OR;

6   - bit-wise XOR;

7   - bit-wise equality;

8   - bit-wise inversion;

9   - Boolean AND;

10   - Boolean OR; and

11   - Boolean negation.

1   Claim 14 (original): The method of claim 12 wherein the

2   information about either of the first operand or the second

3   operand is a pointer to a register.

1   Claim 15 (original): The method of claim 14 wherein the

2   register is a register which contains a link attribute.

1   Claim 16 (original): The method of claim 14 wherein the

2   register is a read-only register.

1   Claim 17 (currently amended): The method of claim 11

2   further comprising:

3   - generating a list which specifies nodes on the

4   partial path as strict hop nodes; and

5   - forwarding the list to an adjacent downstream node

6   on the partial path.

1   Claim 18 (original): A method for processing, by a node of

2   a network, a message carrying at least one network path

3   determination constraint, the method comprising:

4   a) determining whether the node is a tail-end node, a

5   head-end node, or an intermediate node of the path;

6   b) if it is determined that the node is a tail-end

7   node and each of the at least on network path

5

8   determination constraint has been satisfied, then
9   signaling back to an upstream node of the path that
10 the path is OK;
11 c)   if it is determined that the node is one of a
12 head-end node and an intermediate node, then
13   i)   determining whether (a) a strict-hop node is
14   specified as a next node of an explicit path
15   constraint, (b) a loose-hop node is specified as
16   a next node of an explicit path constraint, or
17   (c) no node is specified as an explicit path
18   constraint,
19   ii) if a strict-hop node is specified as a next
20   node of an explicit path constraint, then
21   A)   applying each of the at least one
22   network path determination constraint to an
23   appropriate one of a link between the node
24   and the strict-hop node, the strict-hop
25   node, and the partial path defined,
26   B)   if each of the at least one constraint
27   is satisfied, then forwarding a message
28   carrying the at least one network path
29   determination constraint to the strict-hop
30   node, and
31   C)   if any one of the at least one
32   constraint was not satisfied, then signaling
33   a path error back to an upstream node,
34   iii)   if one of (a) a loose hop node is specified
35   as a next node of an explicit path constraint or
36   (b) no node is specified as an explicit path
37   constraint, then

6

38   A)   performing a constraint-based path
39   determination to a next node selected from a
40   group of nodes consisting of
41   (1) an area border node,
42   (2) an autonomous system gateway node,
43   (3) a node that can process one of the
44   at least one network path determination
45   constraint carried by the message which
46   the present node cannot, or is
47   unwilling to, evaluate,
48   (4)   a specified loose-hop node, and
49   (5)   a node to which constraint
50   processing is delegated,
51   to generate a partial path, and
52   B)   forwarding the message carrying the at
53   least one network path determination
54   constraint to an adjacent downstream
55   node on the partial path.

1   Claim 19 (original):   The method of claim 18 wherein the
2   upstream node is the head-end node.

1   Claim 20 (currently amended):   A machine-readable medium
2   having stored thereon at least one network path
3   determination constraint expressed as an executable
4   instruction, each executable instruction comprising:
5   -   information concerning a first operand;
6   -   information concerning a second operand; and
7   -   an operation code,
8   wherein the machine-readable medium is a
9   component of a first node of a communications network, and

7

10   wherein the at least one network path

11 determination constraint <u>is</u> expressed as an executable

12 <u>program including one or more instructions, and wherein the</u>

13 <u>executable program</u> ~~instruction~~ was received in a message

14 from a second node of the communications network.

1 Claim 21 (original): The machine-readable medium of claim

2 20 wherein the operation code denotes an operation selected

3 from a group of operations consisting of:

4   - bit-wise AND;

5   - bit-wise OR;

6   - bit-wise XOR;

7   - bit-wise equality;

8   - bit-wise inversion;

9   - Boolean AND;

10   - Boolean OR; and

11   - Boolean negation.

1 Claim 22 (original): The machine-readable medium of claim

2 20 wherein the information concerning either of the first

3 operand or the second operand is a pointer to a register.

1 Claim 23 (original): The machine-readable medium of claim

2 22 wherein the register is a register that contains a link

3 attribute.

1 Claim 24 (original): The machine-readable medium of claim

2 22 wherein the link attribute is selected from a group of

3 link attributes consisting of:

4   - link type;

5   - maximum link bandwidth;

6   - maximum reservable link bandwidth;

8

7   - current bandwidth reservation;

8   - current bandwidth usage;

9   - link coloring;

10   - link administrative group;

11   - link delay;

12   - link media type;

13   - optical link wavelength;

14   - optical link minimum signal to noise ratio;

15   - optical link maximum power dispersion;

16   - optical link transmission power; and

17   - optical link receiver sensitivity.

1   Claim 25 (original): The machine-readable medium of claim

2   22 wherein the register is a register that contains a node

3   attribute.

1   Claim 26 (original): The machine-readable medium of claim

2   25 wherein the node attribute is selected from a group of

3   node attributes consisting of:

4   - node type;

5   - minimum node throughput;

6   - node quality of service support; and

7   - node queuing type.

1   Claim 27 (original): The machine-readable medium of claim

2   20 having further stored thereon at least one network path

3   determination constraint as a list of at least one explicit

4   node that is specified to be a part of the network path.

1   Claim 28 (original): The machine-readable medium of claim

2   27 wherein the at least one explicit node is one of a

3   loose-hop node and a strict-hop node.

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1 Claim 29 (previously presented): A network node
2 comprising:
3   a) a plurality of registers including attribute
4   registers, the attribute registers storing attributes
5   of links in the network; and
6   b) a machine-readable medium having stored thereon
7   at least one network path determination constraint as
8   an instruction, each executable instruction including
9   i) a first operand pointer,
10   ii) a second operand pointer, and
11   iii) an operation code,
12   wherein at least one of the first and second
13   operand pointers points to one of the attribute
14   registers, and
15   wherein the executable instruction was
16   received in a message from another network node.

1 Claim 30 (original): The network node of claim 29 wherein
2 the plurality of registers further includes general purpose
3 registers,
4   wherein each of the attribute registers is a
5 read-only register, and
6   wherein each of the general purpose registers is
7 read/write register.

1 Claim 31 (original): The network node of claim 29 wherein
2 the machine-readable medium also has stored thereon at
3 least one network path determination constraint as a list
4 of at least one explicit node that is specified to be a
5 part of the network path.

10

1 Claim 32 (original): The network node of claim 31 wherein
2 the at least one explicitly specified node is one of a
3 loose-hop node and a strict-hop node.

1 Claim 33 (original): The network node of claim 29 wherein
2 the plurality of registers further include accumulation
3 registers storing cumulative attributes of a path.

1 Claim 34 (currently amended): A computer-readable storage
2 machine-readable medium having stored thereon a message to
3 be communicated between different network nodes in a
4 communications network, the message comprising:
5   a) a program including one or more an executable
6   instructions, each executable instruction encoding at
7   least one network path determination constraint; and
8   b) a list of at least one explicit node specified to
9   be a part of the path.

1 Claim 35 (currently amended): The computer-readable
2 storage machine-readable medium of claim 34 wherein the
3 executable instruction includes:
4   - information concerning a first operand;
5   - information concerning a second operand; and
6   - an operation code.

1 Claim 36 (original): A method for processing, by a node of
2 a network, a message carrying at least one network path
3 determination constraint, the method comprising:
4   a) if the tail-end node of the path is in a part of
5   the network, the topology of which is not known by the
6   node, then performing a constraint-based path

11

7   determination to a next node selected from a group of
8   nodes consisting of
9   (i) an area border node, and
10   (ii) an autonomous system gateway node,
11   to generate a partial path; and
12   b) forwarding the message carrying the at least one
13   network path determination constraint to an adjacent
14   downstream node on the partial path.

1   Claim 37 (currently amended): A method for processing, by
2   a node of a network, a message carrying at least one
3   network path determination constraint, the method
4   comprising:
5   a) if a next node specified in a list of explicit
6   nodes is a loose-hop node, then performing a
7   constraint-based path determination to the next
8   loose-hop node to generate a partial path; and
9   b) forwarding the message carrying the at least one
10 .   network path determination constraint to an adjacent
11   downstream node on the partial path,
12   wherein ~~each of~~ the at least one network path
13 determination constraint is <u>expressed in the form of a</u>
14 <u>program including one or more</u> ~~an~~ executable <u>instructions</u>
15 ~~instruction~~.

1   Claim 38 (currently amended): A method for processing, by
2   a node of a network, a message carrying at least one
3   network path determination constraint, the method
4   comprising:
5   a) if the node cannot process any one of the at least
6   one network path determination constraint, performing
7   a constraint-based path determination to a node that

12

8   can process that one of the at least one network path

9   determination constraint, to generate a partial path;

10   and

11   b)   forwarding the message carrying the at least one

12   network path determination constraint to an adjacent

13   downstream node on the partial path,

14   wherein ~~each of~~ the at least one network path

15   determination constraint is <u>expressed in the form of a</u>

16   <u>program including one or more</u> ~~an~~ executable <u>instructions</u>

17   ~~instruction~~.

1   Claim 39 (currently amended): A method for processing, by

2   a node of a network, a message carrying at least one

3   network path determination constraint, the method

4   comprising:

5   a)   if constraint processing has been delegated to

6   another network element, performing a constraint-based

7   path determination to the other network element to

8   which constraint processing has been delegated to

9   generate a partial path; and

10   b)   forwarding the message carrying the at least one

11   network path determination constraint to an adjacent

12   downstream node on the partial path,

13   wherein ~~each of~~ the at least one network path

14   determination constraint is <u>expressed in the form of a</u>

15   <u>program including one or more</u> ~~an~~ executable <u>instructions</u>

16   ~~instruction~~.

1   Claim 40 (previously presented): A network node

2   comprising:

13

3   a)   a path determination facility for performing a

4   constraint-based path determination to a next node

5   to generate a partial path;

6   b)   a signaling facility for

7   i)   receiving a message carrying at least one

8   network path determination constraint, and

9   ii)   forwarding the message carrying the at

10   least one network path determination constraint

11   to an adjacent downstream node on the partial

12   path;

13   c)   a process for generating a traffic engineering

14   database; and

15   d)   a traffic engineering database generated by the

16   processing for generating,

17   wherein the path determination facility is further

18   adapted to determine at least a part of a path based

19   on

20   i)   contents of the traffic engineering

21   database, and

22   ii)   at least one path constraint received from

23   the signaling facility,

24   wherein, if the path determination facility

25   cannot determine a complete constraint-based path to a

26   specified tail-end node, then the path determination

27   facility performs a constraint-based path determination

28   to a next node selected from a group of nodes consisting

29   of

30   -   an area border node,

31   -   an autonomous system gateway node,

14

32   - a node that can process one of the at least
33   one network path determination constraint
34   carried by the message which cannot be
35   evaluated by the present node,
36   - a specified loose-hop node, and
37   - a node to which constraint processing is
38   delegated,
39   to generate a partial path, and
40   the signaling facility forwards a message carrying the at
41   least one path constraint to an adjacent downstream node
42   on the partial path.

1   Claim 41 (original): The routing facility of claim 40
2   wherein the path is a label-switched path.

        Claims 42-52 (canceled)

1   Claim 53 (previously presented): The method of claim 5,
2   wherein the node is an intermediary node, and wherein the
3   act of performing a constraint-based path determination
4   includes determining whether a link from the node to the
5   next node specified in a first portion of the path
6   satisfies the set of at least one constraint.

1   Claim 54 (previously presented): A method for
2   processing, by a node of a network, a message carrying at
3   least one network path determination constraint, the
4   method comprising:

                                15

5   a) performing a constraint-based path determination
6   to a next node to generate a partial path;
7   b) forwarding the message carrying the at least one
8   network path determination constraint to an adjacent
9   downstream node on the partial path, wherein the
10   node is an intermediary node, and wherein the act of
11   performing a constraint-based path determination
12   includes determining whether a link from the node to
13   the next node specified in the first portion of the
14   path satisfies the set of at least one constraint;
15   and
16   c) if the link from the first intermediary node to
17   the next node specified in a first portion of the
18   path is determined to satisfy the set of at least
19   one constraint, then transmitting the received
20   message to the next node.

1   Claim 55 (previously presented): A method for
2   processing, by a node of a network, a message carrying at
3   least one network path determination constraint, the
4   method comprising:
5   a) performing a constraint-based path determination
6   to a next node to generate a partial path;
7   b) forwarding the message carrying the at least one
8   network path determination constraint to an adjacent
9   downstream node on the partial path, wherein the
10   node is an intermediary node, and wherein the act of
11   performing a constraint-based path determination
12   includes determining whether a link from the node to
13   the next node specified in the first portion of the

16

14   path satisfies the set of at least one constraint;

15   and

16   c) if the link from the first intermediary node to

17   the next node specified in a first portion of the

18   path is determined not to satisfy the set of at

19   least one constraint, then transmitting an error

20   message back to the source node.

Claim 56 (canceled)

1   Claim 57 (currently amended): The computer-readable

2   storage machine-readable medium of claim 35 wherein first

3   operand specifies a memory location in which a value for

4   an attribute of a network node or link is stored, and the

5   second operand represents a constraint value for the

6   attribute, and further comprising:

7   c) a code specifying an operation to be performed

8   on the first operand and second operand; and

9   d) a result portion specifying a memory location in

10   which a result of the operation performed on the

11   first operand and second operand is stored.

Claims 58 and 59 (canceled)

1   Claim 60 (currently amended): A network node comprising:

2   a) a plurality of registers including attribute

3   registers, the attribute registers storing

4   attributes of links in the network; and

17

5   <u>b) a machine-readable medium having stored thereon</u>

6   <u>at least one network path determination constraint</u>

7   <u>as an executable instruction, each executable</u>

8   <u>instruction including</u>

9   <u>i) a first operand pointer,</u>

10   <u>ii) a second operand pointer, and</u>

11   <u>iii) an operation code,</u>

12   <u>wherein at least one of the first and</u>

13   <u>second operand pointers points to one of the</u>

14   <u>attribute registers, and</u>

15   <u>wherein the executable instruction was received</u>

16   <u>in a message from another network node, and</u>

17   ~~The network node of claim 29,~~ wherein the

18   machine-readable medium further stores thereon a table

19   including

20   i) a first entry representing a first

21   attribute of a node or link connected to the

22   node,

23   ii) a second entry representing an accumulated

24   value for a second attribute of a node or link

25   connected to the node, and

26   iii) a third entry storing a result of a

27   specified operation performed on one of the

28   first entry and the second entry.

1   Claim 61 (currently amended): <u>A network node comprising:</u>

2   <u>a) a plurality of registers including attribute</u>

3   <u>registers, the attribute registers storing</u>

4   <u>attributes of links in the network; and</u>

18

5   b) a machine-readable medium having stored thereon

6   at least one network path determination constraint

7   as an executable instruction, each executable

8   instruction including

9   i) a first operand pointer,

10   ii) a second operand pointer, and

11   iii) an operation code,

12   wherein at least one of the first and

13   second operand pointers points to one of the

14   attribute registers, and

15   wherein the executable instruction was received

16   in a message from another network node, and

17   ~~The network node of claim 29,~~ wherein the

18   machine-readable medium further stores thereon a memory

19   data structure including

20   i) a first portion storing attributes of nodes

21   or links in the network,

22   ii) a second portion storing network-path

23   constraints, and

24   iii) a third portion storing instructions for

25   performing operations on the stored attributes

26   and the stored constraints; and further

27   comprising:

28   c) a processor for executing the instructions

29   stored in the third portion of memory and computing

30   a path in the network based on results of the

31   executed instructions.

Claim 62 (canceled)

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1   Claim 63 (previously presented): The network node of
2   claim 6 wherein if constraint processing has been
3   delegated to another network element, then the path
4   determination facility further performs a
5   constraint-based path determination to the other network
6   element to which constraint processing has been delegated
7   to generate a partial path.

Claims 64-69 (canceled)

1   Claim 70 (original): A method for processing, by a node of
2   a network, a message carrying at least one network path
3   determination constraint, the method comprising:
4   a) determining whether to delegate constraint
5   processing to another device; and
6   b) if it has been determined that constraint
7   processing has been delegated to another network
8   element, forwarding the message carrying the at least
9   one network path determination constraint to the other
10   device.

1   Claim 71 (previously presented): The method of claim 36
2   wherein each of the at least one network path determination
3   constraint is an executable instruction.

1   Claim 72 (previously presented): The method of claim 70
2   wherein each of the at least one network path determination
3   constraint is an executable instruction.

20

Claim 73-78 (canceled)

1   Claim 79 (new): The method of claim 5, wherein the
2   program includes a plurality of executable instructions.

1   Claim 80 (new): The method of claim 6, wherein the
2   program includes a plurality of executable instructions.

1   Claim 81 (new): The method of claim 11, wherein the
2   program includes a plurality of executable instructions.

1   Claim 82 (new): The method of claim 37, wherein the
2   program includes a plurality of executable instructions.

1   Claim 83 (new): The method of claim 38, wherein the
2   program includes a plurality of executable instructions.

1   Claim 84 (new): The method of claim 39, wherein the
2   program includes a plurality of executable instructions.

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